Success Factors for Service Innovation: A Meta-Analysis

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This is the pre-publication version of: Storey, C., Cankurtaran, P., Papastathopoulou, P. and Hultink, E. J. (2015), Success Factors for Service Innovation: A Meta-Analysis. Journal of Product Innovation Management. doi: 10.1111/jpim.12307

Author Bios

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Success Factors for Service Innovation: A Meta-Analysis

ABSTRACT

Service sectors form a considerable part of the world economy. Contrary to the logical assumption that service innovation research should represent a significant share of all innovation research, the vast majority of innovation studies focus on products as opposed to services. This research presents a meta-analysis of the antecedents of service innovation performance conducted on 92 independent samples obtained from 114 articles published between 1989 and 2015. This research contributes to our understanding of service innovation in three major ways. First, this is the first meta-analysis that specifically assesses the relative importance of antecedents of service innovation performance, while also pinpointing the differences in meta-analytic findings between antecedents of service and product innovation performance. Whilst there are some universal success factors that transcend the boundaries between services and products, the presence of marked differences implies that it would be wrong to treat the development of new services and new products as the same. Second, the meta-analysis demonstrates that the antecedents of service innovation performance are contingent on the sector context (i.e., explicit versus tacit services). Comparing results between products and services, and between tacit and explicit services, there appears to be a continuum where explicit services sit interstitial between tacit services on one side and products on the other. Third, the meta-analysis compares and contrasts the antecedents of two dimensions of service innovation performance (i.e., commercial success and strategic competitive advantage). Previous meta-analyses treated these two dependent variables collectively, which falls short of identifying issues that may affect management decisions when faced with different objectives. Additionally, this research investigates the effect of several other moderators (i.e., culture, unit of analysis, journal quality, and year of publication) on the relationships between the antecedents and service innovation performance. The results are discussed in relation to their implications for research and managerial practice.

Keywords: Service innovation, success factors, performance, meta-analysis.

PRACTITIONER POINTS

- The results clearly demonstrate that service innovation is different from product innovation. However the heterogeneity between types of services may be just as great as that between services and products.
- Service innovation processes must be open, driven by customer engagement and systems must be in place to manage the knowledge that open innovation generates. Efforts must be made to encourage and support employee engagement during development.
- In codified knowledge based services industries, developing new services requires mechanisms to manage the large amounts of explicit information generated and to build synergies with existing systems.
- In tacit or experiential service industries, as the services being developed are fuzzier, the development processes are more complex. The process and the team are critical here.
- Critical success factors are dependent on innovation objectives. Immediate success requires service improvements building on existing capabilities in carefully chosen markets. To develop a longer-term competitive advantage, requires being more innovative, directly involving the customer and investment in organic management practices.

Success Factors for Service Innovation: A Meta-Analysis

INTRODUCTION

The services sector represents a considerable part of the world economy, as evidenced by its 63.6% share of the world's GDP (CIA World Factbook, 2013). On the one hand, a growing body of research demonstrates that service innovation, the development of new or enhanced intangible offerings that involves the firm's performance of a task/activity intended to benefit customers, is a key driver of economic performance at both the firm (Dotzel, Shankar and Berry, 2013) and the national level (Gallouj, 2002). On the other hand, engaging in service innovation does not guarantee success. Service innovation is just as risky as product innovation, with the success rate of launched new services being comparable to that of new products (Page and Schirr, 2008; Storey and Hughes, 2013)[i]. Moreover, despite the acceleration of service innovation research in the last decade, there is no evidence that service firms are getting any better at innovation (Storey and Hughes, 2013). The importance of service innovation for economic performance coupled with the high-risk nature of service innovation makes it imperative to better understand the relative importance of the antecedents of service innovation performance[ii].

Historically, the majority of innovation studies focused on products as opposed to services (Page and Schirr, 2008). Since service innovation research represents a relatively new stream of inquiry, it is only in recent years that scholars have attempted to review the extant literature on service innovation (Biemans, Griffin and Moenaert, 2015; Kuester et al., 2013; Papastathopoulou and Hultink, 2012), providing important insights into the current state of the field. However, there are still calls for further research into service innovation (Ettlie and Rosenthal, 2011). Particularly in the last decade, an increasing number of studies have sought to identify the factors underlying successful service innovation (e.g., Kang and Kang, 2014; Melton and Hartline, 2010; Carbonell, Rodríguez-Escudero and Pujari, 2009). The fragmented findings point to a pressing need for a comprehensive integration of extant work

to pinpoint those antecedents that promise the greatest returns; i.e., the critical or key success factors (Johne and Storey, 1998). For example, Carbonell et al. (2009) find that customer involvement speeds up the development process and improves service quality, but does not have a notable influence on commercial outcomes. Melton and Hartline (2010), on the other hand, document a positive effect of customer involvement on sales performance.

To the best of our knowledge, there has not been an attempt to conduct a meta-analytic integration of the antecedents of service innovation performance. This is in sharp contrast to the numerous meta-analyses conducted on success factors for product innovation (Evanschitzky et al., 2012; Henard and Szymanski, 2001; Montoya-Weiss and Calantone, 1994; Pattikawa, Verwaal and Commandeur, 2006). Given the proliferation of service innovation research in recent years, the time is right to conduct a comprehensive meta-analysis of the antecedents of service innovation performance, and establish the relative importance of these antecedents.

In an effort to address this important gap in the innovation literature, the present study reports the results of a meta-analysis of the extant work on the antecedents of service innovation performance. It offers three major contributions to the service innovation literature. First, this meta-analysis specifically investigates the relative importance of the antecedents of service innovation performance for the first time. There is an ongoing debate as to whether the success factors of service innovation are different from those of product innovation. On the one hand, there is research that shows differences between innovation in product firms and service firms (Nijssen et al., 2006). On the other hand, a recent review of the antecedents of innovation performance found only relatively minor differences (Evanschitzky et al., 2012). Conducting a meta-analysis of service innovation studies enables a comparison with previous meta-analyses of product innovation, answers a call for more research on the differences and similarities between service and product innovation (Biemans et al., 2015), and provides guidance to managers in service industries, but also to managers in product industries attempting to "servitize" their offerings.

Second, this meta-analysis investigates the moderating role of service type on the importance of the antecedents of service innovation performance. There is evidence to suggest that the heterogeneity between types of services may be as great as the differences between services and products (Atuahene-Gima, 1996; Lovelock and Gummesson, 2004). However, there is a lack of research that comprehensively examines the relevance of service innovation success factors across service types (Kuester et al., 2013), and delivers a better understanding of the impact of the service context (Biemans et al., 2015). Several studies distinguish between service industries based on explicit knowledge; i.e., delivered with the aid of technology, versus those that were based on tacit knowledge; i.e., experiential services delivered by interpersonal interactions (Dotzel et al., 2013; Storey and Kahn, 2010). Explicit services comprise of industries such as banking, insurance, telecommunications, and utilities. Tacit or experiential services comprise of industries such as professional services, hospitality, transportation, and health. Acknowledging the possibility that the antecedents of service innovation performance are different for services that are technology-based, and services that are more experiential and delivered by interpersonal interactions (Dotzel et al., 2013; Storey and Kahn, 2010), this study considers the moderating effect of service type (explicit versus tacit) on the extent to which different antecedents contribute to service innovation performance.

Third, unlike existing meta-analyses on product innovation performance that focus solely on a single dependent variable, this meta-analysis considers two distinct, but related, dimensions of service innovation performance - commercial success and strategic competitive advantage (SCA). A large proportion of studies on the antecedents of new product success employ multiple measures of innovation performance (Blazevic and Lievens, 2004; Cooper, Easingwood, Edgett, Kleinschmidt and Storey, 1994; de Brentani, 1989; Hultink and Robben, 1995; Ingenbleek, Frambach and Verhallen, 2010; Storey and Easingwood, 1996). More importantly, these studies show that the antecedents of short-term commercial success are different from those that deliver a longer-term SCA, making it imperative for any integration of existing work on service innovation to consider both performance dimensions separately. A meta-

analysis that compares and contrasts the antecedents of these two dimensions of innovation performance is important for managers who are tasked with achieving potentially competing innovation objectives.

The remainder of this manuscript is organized as follows. The article first presents the theoretical framework that was used for the meta-analytic examination of the antecedents of service innovation performance. It then discusses the development of the database, and the coding and classification of the variables. Subsequently, the results from main effects and moderator analyses are presented. The article concludes with a discussion of the theoretical and managerial implications of the study, and areas for further research on service innovation.

THEORETICAL FRAMEWORK

Empirical studies on service innovation performance started 25 years ago with the work of de Brentani (1989). Initial studies were broad in scope and aimed to identify a general set of antecedents that influence service innovation performance (Cooper and de Brentani, 1991; Cooper et al., 1994). As research on service innovation performance expanded, studies focused down on specific issues to bring more depth and a more nuanced understanding, via contingent models, of the antecedents of service innovation performance (Arnold, Fang and Palmatier, 2011; Storey and Perks, 2015). Despite the growing body of knowledge, there is a lack of understanding as to the relative importance of all identified antecedents that influence service innovation performance. In addition, a number of key issues have not been adequately addressed. First, are the antecedents of service and product innovation performance the same (i.e., are innovation success factors universal)? Second, are the antecedents of service innovation performance universal or contingent on the characteristics of the service? Third, to what extent are the antecedents of short-term and long-term service innovation performance the same? These three key issues are discussed in more detail below.

Antecedents of service versus product innovation performance

It is argued that it is important to study the antecedents of success innovation performance because of the differences between services and products (Song, Song and Di Benedetto, 2009). Relative to products, services are widely recognized as being intangible, inconsistent, and inseparable. As a result, innovation practices developed for products may be inappropriate for services. Intangibility means that services require intensive information exchanges between service employees and customers (Lievens and Moenaert, 2000b). Inseparability refers to the simultaneity of service production and use requiring the interaction between customers and service employees during service delivery (e.g., de Brentani, 1989). As a result, services exhibit greater variance in their delivery performance (i.e., inconsistent or heterogeneous performance) making new services more difficult for consumers to assess, especially before purchase, making consumption inherently less likely (Dotzel et al., 2013). Risks are associated with service innovation because it is difficult for companies to fully gauge customer reactions prior to the introduction of a new service (Kuester et al., 2013). These service characteristics suggest that the antecedents of service innovation performance may be different from those for products.

The conceptual framework presented in this article builds on previous product innovation meta-analyses, and identifies six broad categories of service innovation performance antecedents. Henard and Szymanski (2001) identify four categories of antecedents of innovation performance: (1) product (*service offering*) characteristics that capture elements pertaining to the offering, such as value, innovativeness, and how well the offering meets customer needs; (2) strategy characteristics that refer to a firm's planned actions that can help it achieve competitive advantage in the marketplace; (3) process characteristics that refer specifically to elements associated with the development process and its execution; and (4) marketplace characteristics that capture elements that describe the target market. Additional meta-analyses identify organizational characteristics, which include the structure, climate and design of the firm (Evanschitzky et al., 2012; Montoya-Weiss and Calantone, 1994), and team characteristics, which concern how development teams are organized and managed (Cankurtaran, Langerak and Griffin, 2013; Chen, Damanpour and Reilly, 2010) as separate categories of antecedents.

The conceptual framework of the present study used these six categories of antecedents as its starting point for three reasons. First, whilst this classification schema is not definitive, it has pedagogical value and intuitive appeal (Henard and Syzmanski, 2001). Second, using this classification schema enables comparisons with meta-analytic findings on the antecedents of service and product innovation performance. Third, it further reflects frameworks proposed in the service innovation literature (de Brentani 2001; Johne and Storey, 1998; Kuester et al., 2013). However, the present study incorporated in its conceptual framework a number of antecedents that are specific to service innovation (e.g., service quality, front-line staff), within these six categories.

Tacit versus explicit services

Although the heterogeneity of service sectors has been acknowledged for years, research on service innovation mainly focuses on specific service environments (Kuester et al., 2013). Single industry studies are dominated by the financial services sector (Avlonitis et al., 2001; Lievens and Moenaert, 2000a; Storey and Easingwood, 1998). However, there are also specific service industry sector studies ranging from medical (Zippel-Schultz and Schultz, 2011), hospitality (Nasution et al., 2011), software (Gobeli, Koenig and Bechinger, 1998), IT/Telecom (van Riel, Lemmink and Ouwersloot, 2004) to professional services (Castro-Lucas et al., 2012; 2013). This stream of research has shown that the antecedents of service innovation performance vary across different service industries, making it clear that a one size fits all approach to service innovation is no longer appropriate (Storey and Hull, 2010). However, whilst there are studies on service innovation performance that are cross-sectional (Froehle et al., 2000; Hull, 2003), there is a lack of research that comprehensively examines the relevance of the antecedents of service innovation performance between different types of services.

Services are either experiential in nature and delivered by interpersonal interactions, or process-based and delivered with the aid of technology (Dotzel et al., 2013; Hipp and Grupp, 2005). Storey and

Kahn (2010) refer to these services as tacit or explicit services. Tacit knowledge services are characterized by simultaneous production and consumption (Hipp and Grupp, 2005). Such experiential services suffer from heterogeneity due to inconsistency in human performance (Dotzel et al., 2013) and are reliant on the tacit knowledge held by the people as they are delivered by interpersonal interactions. Explicit knowledge services are characterized by either their service offerings being substantially based on information and communication networks, or alternatively, they have to process large amounts of coded information data (Hipp and Grupp, 2005). Technological systems help to remove the synchronization of time and location between service provider and customer. Explicit services are often centrally produced, separable, homogeneous or consistent due to standardized processes and functionally associated with service technologies (Dotzel et al., 2013). Whilst the distinction between tacit and explicit service industries is not a straight dichotomy, emerging research has shown considerable differences in the antecedents of service innovation performance between both groups of services (Storey and Hull, 2010; Storey and Kahn, 2010). For example, MacCurtain et al. (2010) documented a direct positive link between knowledge sharing among project team members and market performance in the (tacit) software industry. By contrast, Lievens and Moenaert (2000a) concluded that in the development of (explicit) financial services, this relationship is mediated by uncertainty reduction as perceived by team members.

Commercial success versus strategic competitive advantage

Research at both the project and the firm level alike recognizes that service innovation performance is a multidimensional concept (Cheng and Huizingh, 2014; Storey and Easingwood, 1998). It is important to distinguish between measures of short-term commercial success, and indicators of longer-term SCA. Commercial success represents the market acceptance of the new service. It is usually measured by its sales performance, its financial performance, and by the extent to which the new service achieved its commercial objectives (Avlonitis, Papastathopoulou and Gounaris, 2001). However, a

fundamental purpose of service innovation is to contribute to the further development of the business as a whole. Therefore, studies also employ performance indicators that measure the less immediate benefits of service innovation. A firm's SCA is conceived as the range of outcomes from the firm's innovation activities that enables the firm to achieve superior market advantages and resist erosion by competitors (Bharadwaj, Varadarajan and Fahy, 1993). These SCA outcomes include the establishment of new markets, the attraction and retention of new and existing customers, increased customer loyalty, cost efficiencies, and brand reputation (de Brentani, Kleinschmidt and Salomo, 2010; Salunke, Weerawardena and McColl-Kennedy, 2013). Reflecting the knowledge based view of the firm and absorptive capacity theory, learning in particular is seen as a key SCA outcome of service innovation (Lievens and Moenaert, 2000c; Mahr, Lievens and Blazevic, 2014).

Previous research on both product and service innovation have empirically distinguished between commercial success and SCA (e.g. Cooper et al., 1994; Hultink and Robben, 1995). Several studies employed measures of both dimensions, and showed that there are considerable differences between the key antecedents of commercial success and longer-term SCA. For example, research has shown that the degree of service innovativeness has a positive impact on SCA (Avlonitis et al., 2001). However developing innovative services causes significant risks to the customer, which can slow down adoption, and therefore may struggle to have an immediate impact on commercial success. Conversely, developing run-of-the-mill copies or enhancements can produce short-term results but are unlikely to grow an organization in the long-term (Storey and Easingwood, 1998). Identifying differences in the antecedents of commercial success and SCA is also important for managers as they often need to make trade-offs between competing antecedents depending on the desired performance outcome (Storey and Easingwood, 1998).

METHODOLOGY

Database development

A number of complementary sources consistent with those in previous meta-analyses and innovation research reviews (Calantone, Harmancioglu and Droge, 2010; Evanschitzky et al., 2012; Page and Schirr, 2008; Papastathopoulou and Hultink, 2012) were used to create a comprehensive list of relevant studies as input for the meta-analytic investigation of the antecedents affecting service innovation performance. Computerized database searches were conducted in ABI/INFORM Global, EBSCO, EconLit, JSTOR, ScienceDirect, and Web of Science using key words such as service innovation, new service development, NSD, new service performance, and innovation in service industries (e.g., financial, healthcare, telecommunications, software). This was followed by a thorough inspection of references from previous literature reviews on service innovation (de Jong and Vermeulen, 2003; Goldstein et al., 2002; Johne and Storey, 1998; Kuester et al., 2013; Menor, Tatikonda and Sampson, 2002). In addition, a manual search of the following innovation, marketing and management journals was conducted: *Journal of the Academy of Marketing Science, Journal of Marketing, Journal of Marketing Research, Journal of Operations Management, Journal of Product Innovation Management, Management Science, Marketing Science, Journal of Services Research, Journal of Business Research, Industrial Marketing Management, European Journal of Marketing* and *International Journal of Research in Marketing.* Finally, to access new or unpublished work, articles on service innovation in the proceedings (2009-2013) of two specialized peer-reviewed conferences were sought: EIASM International Product Development Management Conference (IPDMC) and the PDMA International Research Forum.

Four criteria determined whether to include a study in the meta-analytic database. A study was included when it (1) was published in a peer-reviewed journal (or conference proceedings); (2) was an empirical study of service innovation (with the majority of the sample being services); (3) had at least one measure related to service innovation performance; and (4) provided correlation statistics for relationships between potential performance antecedents and service innovation performance.

Two rules were employed to ensure an acceptable level of independence of the correlations in the database. First, if a publication reported results from multiple independent samples, their results were entered as separate independent samples (see Geyskens, Steenkamp and Kumar, 2006). Second, if multiple publications were based on the same or on overlapping datasets, they were treated as a single study and the correlations between two identical variables were entered only once (Franke and Park, 2006; Geyskens et al., 2006). The final database consisted of 92 independent samples obtained from 114 articles published between 1989 and 2015.[iii]

Variable classification and coding

A coding protocol that specified the information to be extracted from each study was used to reduce errors and ensure coding consistency (Lipsey and Wilson, 2001). This coding protocol included the categorization of the service innovation antecedents and performance dimensions, sample characteristics, and effect sizes. For each study, the reported service innovation antecedents were allocated to one of the six pre-defined categories (service offering characteristics, strategy characteristics, process characteristics, team characteristics, organizational characteristics, and marketplace characteristics). The studies were coded independently by two authors, with an initial inter-rater reliability of 90%. Discussion resolved disagreements in coding.

Success factor classification

As one of the objectives of the study was to compare the antecedents of service innovation performance to those of products, coding was done in concordance with the typology of Evanschitzky et al. (2012), which builds on previous meta-analyses (Henard and Syzmanski, 2001; Montoya-Weiss and Calantone, 1994).

However, the present study incorporated in its conceptual framework a number of antecedents that are specific to service innovation, and are therefore not represented in the classification by

Evanschitzky et al. (2012). Three antecedents (*service quality*, *front-line staff involvement*, and *innovation culture*) were added to the classification based on a recent review of service innovation performance by Kuester et al. (2013). Furthermore, some of the studies in the meta-analytic database reported effect sizes that could not be cleanly coded within the existing categorization scheme. This necessitated the adoption of a more fine-grained approach to variable classification and identified a further five antecedents: *proficient operations and delivery systems*, *technical development proficiency*, *knowledge integration mechanisms*, *absorptive capacity* and *firm reputation*. Additionally, *innovation strategy* was identified as a distinct strategic orientation of the firm. However, the data did not allow us to distinguish between marketing synergy and technological synergy; between a structured and a formalized approach to service innovation; or between market potential and competitive response. In total, 37 antecedents of service innovation performance in six categories were identified. These antecedents are listed and defined in the Appendix.

Service innovation performance dimensions

As existing research recognizes that service innovation performance is a multidimensional construct (Cheng and Huizingh, 2014; Storey and Easingwood, 1998), two dimensions of service innovation performances were distinguished. Commercial success represents the market acceptance of the new service, and is typically measured by sales performance, financial performance and the extent in which the new service achieved its commercial objectives (Avlonitis et al., 2001). SCA was conceived as a range of service innovation outcomes that enables the firm to achieve superior market advantages and resist erosion by competitors (Bharadwaj et al., 1993; Storey and Kahn, 2010). These longer-term strategic competitive advantages accruing from service innovation included the establishment of new markets, the attraction and retention of potential and existing customers, increased customer loyalty, and learning (de Brentani et al., 2010; Lievens and Moenaert, 2000c; Salunke et al., 2013). Approximately

40% of the studies in the meta-analytic database included both commercial success and SCA performance measures.

Service type

To allow for the consideration of the nature of the service context in the analysis, the studies were grouped according to whether the samples were predominantly from industries based on explicit knowledge (i.e., delivered with the aid of technology), versus those that were based on tacit knowledge (i.e., experiential services delivered by interpersonal interactions) (cf. Dotzel et al., 2013, Storey and Kahn, 2010). Explicit services comprised of industries such as banking, insurance, telecommunications, and utilities. Tacit or experiential services comprised of industries such as professional services, hospitability, transportation, and health.

Other moderators

Several contextual and methodological study characteristics that can potentially influence the association between the antecedents and service innovation performance were coded. Hofstede, Hofstede and Minkov's (2010) cultural dimensions of power distance, individuality, uncertainty avoidance, masculinity and long-term orientation have been found to influence the effectiveness of NPD success factors (Evanschitzky et al. 2012). Therefore, each study was classified as either high or low on each of these five cultural dimensions. The unit of analysis (i.e., project versus program) was also coded. Research on service innovation performance is split between those that study the performance of a single new service development project (i.e., the project level) and those that look at the performance of developing service innovations over a period of time (i.e., the program level). Further moderators that were coded were year of publication (pre-2010 versus later), and journal quality (Association of Business Schools rank four versus the rest; Harvey et al., 2010). Two additional moderators were considered (objective versus subjective measures; B2B versus B2C market); however, there were not enough data

points for subsequent analyses.

ANALYSIS AND RESULTS

Main effects analysis

The coding yielded 590 and 345 harvested effect sizes for commercial success and SCA, respectively. Sample sizes ranged between 38 and 2,865 for commercial success, and between 38 and 467 for SCA. The average and total sample sizes were 171 and 105,735 for commercial success, and 159 and 54,784 for SCA. When articles reported multiple variables for the same relationship, the average correlation in the meta-analytic database in order to minimize bias that may occur due to multiple counts of dependent effect size estimates was entered (see Brown and Peterson, 1993; Crosno and Dahlstrom, 2008).

Following recently published meta-analyses (Calantone et al., 2010; Cankurtaran et al., 2013), this study adhered to the analytic approach of Hunter and Schmidt (2004). The biasing effect of both sampling and measurement errors were corrected for prior to the analyses. To correct for sampling error, the weighted-mean correlation ($\bar{r}$) was calculated by weighing each correlation with its corresponding sample size and standard deviation. To correct for measurement error, each reported correlation was divided by the square root of the reliabilities of the two constructs. For averaged correlations, an average reliability coefficient was computed (see Gerwin and Barrowman, 2002). When reliability information was not provided, the mean reliability from the other articles investigating the same relationship was used as the best estimate of the missing reliability coefficient (Balkundi and Harrison, 2006). The true score correlation (ρ) was reached by computing the weighted average of the reliability-corrected correlations.

The random effects (RE) model was used for calculating the variability in effect size estimates once they had been averaged across studies (Franke and Park, 2006; Rodriguez Cano, Carrillat and Jaramillo, 2004). The RE approach treats the variability as arising from two sources: (1) study sampling

(between-studies variance), and (2) the sampling of individuals within studies (sampling error variance). Compared to the fixed-effects (FE) model, which attributes variability in findings only to sampling error variance, it is less susceptible to Type I errors (Hunter and Schmidt, 2000).

Tables 1 and 2 report the main effects results for commercial success and SCA, respectively. The tables provide information on the number of correlations (k), combined sample size (N), sample-weighted uncorrected correlations ($\bar{r}$), and estimated true correlations corrected for sampling error and unreliability (ρ) for each effect size. 95% confidence intervals were constructed around $\bar{r}$ for each relationship using the random effects standard error formula (Hunter and Schmidt, 2000). If this confidence interval does not include zero, the $\bar{r}$ estimates are significantly different from zero.

The majority of characteristics (32 out of 37) were found to have significant effects on both commercial success and SCA. Following previous meta-analyses of the antecedents of product innovation performance (Evanschitzky et al., 2012; Henard and Szymanski, 2001), this is not unexpected. *Environmental uncertainty, firm reputation, firm size, and firm age* failed to demonstrate significant correlations. In addition, *project size* failed to show a significant relationship with commercial success (it was excluded from the analysis for SCA because only two studies reported correlations).

File-drawer analyses were conducted to assess the susceptibility of the findings to availability bias; i.e., the tendency of published studies to report greater effect sizes than unpublished ones, which may lead to inflated meta-analytic estimates (Lipsey and Wilson, 2001). The last column reports the fail-safe k, or number of additional unpublished studies that would be needed to reduce the effect size to below statistical significance ($p< 0.05$) to address potential concerns of availability bias (Orlitzky, Schmidt and Rynes, 2003). The sufficiently large fail-safe k values (less than 10 in only one instance) indicate that the meta-analytic effect sizes are resistant to unpublished null effects.

<< Insert Tables 1 and 2 about here >>

To further explore differences in the antecedents of innovation performance between services and products, the rank order of the top ten antecedents for the current study (in terms of commercial success) are listed alongside the top ten antecedents from Evanschitzky et al. (2012); see Table 3. Only two factors – *launch proficiency* and *internal communication* are in the top ten for both services and products. A number of other factors, whilst not being in the top ten of both lists, are just outside. These are: *pre-development task proficiency*, *marketing research task proficiency*, *a formal/structured development process* and *dedicated human resources*. While these six antecedents can be considered universal success factors, the lack of alignment of the relative importance between service and product sectors suggests that innovation in the two sectors is indeed different, and that managers in service companies need to have different priorities to maximize their return on innovation investments.

<< Insert Table 3 about here >>

Commercial success versus SCA

Table 4 compares the effect sizes between commercial success and SCA. A significant *Z*-value for 18 of the 37 relationships indicates that the effect sizes are significantly different between both performance dimensions. For five antecedents (*synergistic strategy, launch proficiency, front-line involvement, internal communication*, and *market attractiveness*), the effect on commercial success is greater than their effect on SCA. For 13 antecedents, the effect on SCA is greater than their effect on commercial success. Interesting to note is that most service offering characteristics such as quality and innovativeness have a larger effect on SCA than on commercial success.

<< Insert Table 4 about here >>

Moderator analyses

Although the main effects analysis corrects for differences in sample size and reliability of measures, substantial variance across studies may remain even after correcting for differences in sample size and reliability. Consequently, the population correlation estimates obtained in the first step may vary across independent samples in the database, suggesting that the main effects may not be generalizable across all primary studies in the meta-analytic database. This generalizability of the main effects findings was assessed in two ways (Lipsey and Wilson, 2001). The *Q*-statistic assesses the homogeneity of the effect size distributions (Hedges and Olkin, 1985). A significant *Q* suggests a likely presence of effect size heterogeneity, and warrants a search for moderators to explain it. The second method used was the 75% rule (Hunter and Schmidt, 2004). According to this rule, moderators are unlikely to have caused variation and the effect size can be considered homogeneous across studies when statistical artifacts (such as sampling and measurement errors) explain 75% or more of the observed variance. All antecedents studied displayed a heterogeneous relationship with commercial success, warranting a search for moderators (see Table 1)[iv].

Moderator analyses were carried out using the ANOVA-analogue test (Lipsey and Wilson, 2001). To compare estimated true population correlations of categories, separate meta-analyses were conducted for each category using the reliability-corrected correlations since they are more accurate representations of effect size compared to reported correlations (Hunter and Schmidt, 2004). Table 5 reports the corrected population correlation coefficient (ρ) for explicit and tacit services, as well as the between-group goodness-of-fit statistic Q_b. A statistically significant Q_b indicates that the mean effect size differs between both groups (Joshi and Roh, 2009). The ρ's for moderator categories were computed only when at least three observations were present for each category to ensure estimate stability (see Geyskens et al., 2006)[v].

Service type

Table 5 shows that seven antecedents of service innovation performance (*proficient operations and delivery systems*, *synergistic strategy*, *market orientation*, *cross-functional integration*, *knowledge integration mechanisms*, and *environmental uncertainty*) have a larger effect size for explicit services than for tacit services. In contrast, 19 antecedents of service innovation performance have a greater influence for tacit services than for explicit services, many of which refer to process and organizational characteristics.

<< Insert Table 5 about here >>

Other moderators

Table 6 presents the results for the moderating effects of the five cultural dimensions. The results show that power distance has the biggest influence: 23 antecedents of service innovation performance show significant differences between high and low power distance cultures. Most organizational characteristics and to a lesser extent team characteristics show a larger correlation with commercial success in high than in low power distance cultures. It is also notable that most significant correlations for individuality were higher in low individuality cultures. The results for uncertainty avoidance and pragmatism/long term orientation showed a mixed picture. Consistent with Evanschitzky et al. (2012), masculinity has the weakest influence on the antecedent – service innovation performance relationships.

Table 7 presents the results from the other moderator analyses (unit of analysis, journal quality, and year of publication). For six antecedents of service innovation performance (*synergistic strategy*, *service responsiveness*, *cross-functional integration*, *market attractiveness*, *market turbulence* and *environmental uncertainty*), the effect on commercial success is larger for the project than for the program level. For nine antecedents of service innovation performance (*service offering advantage*, *technological sophistication*, *proficient operations and delivery systems*, *market orientation*, *development efficiency*, *formal/structured process*, *launch proficiency*, *customer integration/input* and

senior management involvement), the effect on commercial success is larger at the program than at the project level.

The results in Table 7 further show that the publication source (journal quality) influenced the results. For five antecedents of service innovation performance (*synergistic strategy*, *service responsiveness*, *strategic orientation*, *cross-functional integration* and *environmental uncertainty*), effect sizes are larger for articles published in leading journals; interestingly, the effect size of 16 antecedents of service innovation performance are larger for those in other journals. The influence of the year of publication is limited.

<< Insert Tables 6 and 7 about here >>

THEORETICAL IMPLICATIONS

This first meta-analysis of the antecedents that drive service innovation performance primarily aimed to answer the following questions: (1) what are the key antecedents of service innovation performance (and are they different from those for products)?; (2) to what extent does service type (tacit versus explicit) influence the impact of different antecedents on service innovation performance?; and (3) to what extent are the antecedents of service innovation performance different for short-term commercial success versus a longer-term SCA? The results show theoretically interesting differences between services and products; between different types of services, and between alternative measures of service innovation performance. Additional contextual moderators shed further light on service innovation performance. These are discussed in turn.

Comparing success factors for services and products

In meta-analyses on new product performance, the number one success factor is product advantage (Evanschitzky et al., 2012; Henard and Szymanski, 2001). The advantage of the core offering

is also important for service innovation; however, its importance compared to other antecedents is relatively low. This is not surprising as services are intangible; the customer cannot experience the offering (see, touch, or try it) a priori. Instead *service quality* and *proficient operations and delivery systems,* as part of an augmented service offering (Storey and Easingwood, 1998), are significant antecedents of service innovation performance. These factors have not been identified as antecedents of product innovation performance, thereby demonstrating the distinctiveness of service innovation.

An *innovation strategy* has not been identified as a critical antecedent in meta-analyses of product innovation. It is, however, one of the most influential antecedents of service innovation performance. In addition, an *innovation culture* (one that supports innovation, creativity and learning) has been identified as a critical antecedent to service innovation performance for the first time. It may be that an innovation strategy is taken as a given in many product firms whereas in service organizations the development of new services has not always been a priority. Services are intangible, thus can be easily and quickly copied, which may reduce a service firm's desire to innovate (de Brentani, 1989). As such, much service innovation is incremental in nature (Johne and Storey, 1998). This may explain the importance of *service innovativeness,* which is in the top ten of antecedents of service innovation performance (whilst it is well down the list for products). Often, competitors copy new services quickly, easily, and cheaply; unlike innovative products, which may gain years of protection via patents, proprietary technology, or simply the length of time it takes to do the development work (Prajogo, 2006). Thus, it may be that service firms need to develop more radically new services in order to achieve success in the marketplace and enjoy a positive performance effect similar to that of their product-oriented counterparts.

Due to the importance of customer contact staff in delivering new services, their involvement in development is a critical antecedent of service innovation performance. The *involvement of front-line staff* has been recognized as a key success factor specific to service innovation (de Brentani, 1989). Such customer service staff has not been documented to play a significant role in product innovation. However, they are crucial in identifying and articulating customer needs, and in successfully launching

new services. Given the importance of service employees for service innovation, there is an increased need for organic *organizational design* practices, such as reward structures and job design, to drive service innovation (Atuahene-Gima 1996; Storey and Hull, 2010). Good organizational design is important in encouraging and supporting employee engagement; hence, it is the third most important antecedent for service innovation performance whilst it is near the bottom for product innovation.

An emerging theme in the innovation literature is the concept of open innovation (Chesbrough, 2003). This seems to be particularly important for services as compared to products. *Customer integration/input* and *external relations* are both important antecedents for service innovation performance. It is recognized that in many service industries service ecosystems are now required, with an alliance of partners, to create customer value (Lusch and Nambisan, 2015). This is reflected in the importance of open innovation for services; however, further research is needed into how members of an ecosystem can co-develop effectively. In addition, this is the first time that *absorptive capacity* has been identified as a key antecedent of service innovation performance. Linking open innovation theory to the resource based view of the firm, the theory of absorptive capacity stresses the importance of an ability to acquire and assimilate outside knowledge for successful innovation (Cohen and Levinthal, 1990). These theories suggest that for service firms, the idea of working with entities outside of the firm to develop and deliver innovations is crucial in today's economy. Contrasting this is the finding that, for products, dedicated *innovation resources* (traditionally R&D resources) are particularly important. It seems that product firms succeed by creating knowledge internally whereas service firms succeed more often by utilizing external knowledge and capabilities.

The importance of *customer integration/input, external relations* and *absorptive capacity* suggest that there is an extensive amount of knowledge to be managed during the new service innovation process. However, as services are intangible, knowledge will often be tacit and difficult to manage (Johne and Storey, 1998; Blindenbach-Driessen and van den Ende, 2014). This implies a greater need for processes and tools to collate, store and share knowledge during development. Consequently, *knowledge*

integration mechanisms are an important antecedent for service innovation performance that has not been previously identified in product innovation meta-analyses.

Efficiency of the development process appears more important for service innovation than for product innovation. The definition of service innovations is fuzzier than in product firms. In services, changing anything that affects the service experience or improves the service offering can be seen as an innovation in the customers' eyes (Johne and Storey, 1998). A consequence of this is that service innovation is spread throughout the organization with much activity being undertaken in the vicinity of the operational processes (Blindenbach-Driessen and van den Ende, 2014). Furthermore, there is often a lack of clarity in firms as to who "owns" service innovation (Edvardsson, Haglund and Mattsson, 1995). This means that the innovation process is likely to be less efficient in service firms compared to product firms; hence the relative importance of development efficiency for service innovation performance.

For products, a *market orientation* is a key success factor. It is the second most important product innovation success factor but it is well down the list for services. Service firms depend on maintaining a close relationship with their customers, often based on person-to-person interactions, and their marketing activities are spread throughout the firm (Grönroos, 1983). Therefore, service firms, in general, may be considered more market orientated. Hence, possibly due to a ceiling effect, the weaker influence of a market orientation on service innovation performance. *Innovation resources* are also a key antecedent for product innovation performance, but are less important for new services. There are two possible explanations. First, the incremental nature of most service innovations may not require as much specific resources dedicated to them. Second, as much service innovation is also spread throughout the organization and located nearer to the point of delivery, it may require less dedicated R&D resources (Blindenbach-Driessen and van den Ende, 2014).

To conclude, the results clearly demonstrate that service innovation is different from product innovation. Whilst there are some universal success factors that transcend the boundaries between

services and products, the differences imply that it would be wrong to treat the development of new services and new products as the same. The key capabilities required for success are clearly distinct.

Tacit versus explicit services

Moderator analysis results showed considerable variation in the critical antecedents of service innovation performance between tacit and explicit services, supporting the suggestion that the heterogeneity between types of services may be just as great as the differences between services and products (Atuahene-Gima, 1996; Lovelock and Gummesson, 2004).

Tacit experiential services require an interaction between the service provider and the customer; and in some circumstances interaction amongst customers as well. Industries that rely heavily on service employees to produce and deliver services exhibit features such as inseparability due to simultaneous production and consumption of the service, and heterogeneity due to inconsistency in human performance (Dotzel et al., 2013). In these industries, one of the main factors behind service innovation performance is the *quality of the service* experience (Storey and Hull, 2010).

In contrast, service offerings in explicit service industries are often centrally produced, separable, homogeneous or consistent due to standardized, scalable, processes where explicit knowledge is embedded into objects such as self-service delivery systems (Hipp and Grupp, 2005; Storey and Kahn, 2010). Here, service failures are primarily associated with the lack of *proficient operations and delivery systems* (Dotzel et al*.,* 2013), which explains why operational capabilities have a greater impact for explicit services compared to tacit services (Storey and Hull, 2010). However, *technological sophistication* has a larger impact for tacit services than explicit services. It appears that in today's experiential economy, technology is important in enabling service staff to spontaneously delight customers, to recover from service failures, and to customize service offerings (Bitner, Brown, and Meuter, 2000).

The impact of strategy characteristics also differs between both service types. For explicit services, it is important to build on synergy between the operational requirement of the new services and the existing *operations and delivery systems* of the firm. For tacit services, an *innovation strategy* built around *service responsiveness* is the key course of action. Responding to customer needs drives service innovation performance; however, often this understanding is limited to expressed needs which create no new insights into value-adding opportunities (Narver, Slater and MacLachlan, 2004). For explicit services, it may be possible to build success on satisfying expressed needs, developing incremental innovations, and building on what has been offered before. *Market orientation* is more important here as it encourages and supports the refinement and adaptation of current innovations to meet current needs rather than the development of new products targeted at emerging new needs (Atuahene-Gima and Ko, 2001; Bennett and Cooper, 1981). In addition, for tacit services, customers may have more difficulty expressing their needs and companies expending more effort in understanding their needs may reap greater benefits.

There is a contrast in the way in which knowledge is managed during service innovation. *Knowledge integration mechanisms* appear to be more powerful when the knowledge to be shared is explicit rather than tacit (Storey and Kahn, 2010). *Cross-functional integration* is also important. It may be that developing explicit services requires more intense integration and cross-functional teaming, increasing its relative importance. Coupled with the increasing use of virtual development teams (McDonough, Kahn and Barczak, 2001), this drives the necessity of knowledge integration mechanisms.

Tacit services depend more on knowledge expressed from person to person (Storey and Kahn, 2010) suggesting the increased importance of *internal communications*. In this context, it is imperative to manage the increased variability in production and service delivery (de Brentani, 1989), and it seems that job rewards and structured work processes provide a winning organizational combination. The findings show that for tacit services there is an increased need for organic management practices such as *team empowerment, organizational design* and *senior management support* to achieve service

innovation performance. Such practices are necessary when dealing with subtle and imprecise information, and the requirement to react opportunistically to emergent situations that transcend planned actions (Storey and Hull, 2010).

Service innovation process characteristics are more important for tacit services. The development of such services may be fuzzier as they are labor-intensive and hence more difficult, for tacit compared to explicit services. In these industries, development projects are likely to be fuzzy in nature with high levels of uncertainty and, paradoxically, there is a greater need for a *structured and formalized process* to help focus and control development efforts (Storey and Hull, 2010).

These results demonstrate that not all service innovations can be treated in the same way. The effectiveness of innovation antecedents is contingent on the type of service. Failing to acknowledge the influence of such characteristics decreases the generalizability of sector-specific research. Comparing results between products and services; and between tacit and explicit services, there appears to be a continuum. Explicit services sit interstitial between tacit services on one side and products on the other. More research is needed into how the characteristics of types of services (and indeed types of products) affect the antecedents that drive innovation performance.

Success factors for commercial success and SCA

Table 4 showed that there are considerable differences in the results for commercial success and those for SCA. Previous meta-analyses treated these two dependent variables collectively. This may have led to a failure to identify issues that may affect management decisions when faced with different objectives (e.g., short-term success versus long-term growth).

Factors that affect immediate sales, such as *market attractiveness,* will be essential for commercial success but they may have limited impact on long-term SCA. Customers cannot experience services, or try them, prior to purchase. Therefore, customers necessarily rely on communications rather than solely on the service itself to make a purchase decision (Cooper et al., 1994). Hence, the strong

influence of *launch proficiency* on commercial success. However, what leads to longer-term performance gains is the quality of what is delivered to service customers (*service quality*, *proficient operations and delivery systems)*. Hence, the relative impact of these factors is larger on SCA than on commercial success.

The results further showed that *service innovativeness* and *innovation strategy* are crucial in driving a SCA (especially in a turbulent marketplace). However, developing innovative services increases perceived risk to the customer (de Brentani, 2001), which can slow down adoption and therefore may reduce the impact on initial sales or profitability. Conversely, developing run-of-the-mill copies or enhancements can produce short-term results but are unlikely to grow an organization in the long-term (Storey and Easingwood, 1998). Similarly, whilst a strategy focused on building *synergy* with existing capabilities may help commercial success, it is less likely to achieve a SCA (Cooper et al., 1994; de Brentani 1989).

Customer integration/input had a larger impact on SCA than on commercial success. A criticism of listening to the customer during development is that they have difficulty articulating their needs (Mahr et al., 2014), leading to incremental and trivial improvements (Ordanini and Parasuraman, 2011). The relative importance of customer integration for SCA suggests that by involving customers throughout the development process, rather than mere listening to them, is a way of creating truly value-adding service innovations (Narver et al., 2004).

The successful launch of new services often depends on the skills and knowledge of the customer contact staff (de Brentani 1989); hence the importance of involving them during development, supported by internal communications. However, staff may be reluctant to be involved, especially if change is large (Storey and Easingwood, 1998) or when new services do not fit in with the existing capabilities of the firm. Therefore, their impact on SCA is limited.

Factors such as *team climate*; *cross-functional integration, empowerment* and an *innovation culture* have a particularly large impact on SCA (relative to commercial success). These are elements of

organic management practices that are crucial in innovative organizations (Burns and Stalker, 1961; Hull, 2003) and reflect the firm's "operant" resources that create the requisite environment to motivate and enable service innovation to take place (Madhavaram and Hunt, 2008; Storey and Hughes, 2013). Such factors help drive service innovativeness, and thus, build the capabilities of the organization (Blazevic and Lievens, 2004).

Culture and other moderators

Culture has been found to be a significant moderator in previous meta-analyses. Evanschitzky et al. (2012) found the effects of antecedents to be weaker for countries with individualism, long-term orientation and power distance, and stronger for uncertainty avoidance. The research supports the result for individualism (see Table 6). It may be that cultures with strong collectivistic values suffer from common method bias and hence inflate the correlations between variables. However, support for this suggestion is beyond the scope of this study. Power distance had the greatest influence on the antecedents. Service innovation process characteristics were weaker for high power distance countries (supporting Evanschitzky et al. 2012); however, the opposite effect was found for team and in particular organizational characteristics. For cultures with formal power relationships, more effort may be needed in service firms to manage the people that deliver innovation success. The results for the other cultural dimensions were mixed with no clear pattern emerging. More research is needed to explain these results.

The results showed that the unit of analysis affects the antecedents of service innovation performance. Marketplace characteristics emerge as key antecedents in project-level studies, whereas service offering characteristics and service innovation process characteristics have a larger impact at the program-level. It may be that an organization has more control over the choice of markets for an individual project, but at the program level where service innovations may be launched across multiple markets, the influence of these factors is diminished. Since process characteristics such as the *efficiency of the development process* and a *formal/structured process* can only be fostered in the long run, their

impact on the longer-term program-level may be more pronounced compared to the shorter-term project-level.

Regarding publication source, service offering and organizational characteristics have a larger influence on service innovation performance in second tier publications than in the top journals. The influence of the year of publication is rather limited, although it is interesting to note that the correlations for strategy characteristics tend to be larger in recent publications, whereas the correlations for team and marketplace characteristics tend to be larger in articles published before 2010. As also noted by Evanschitzky et al. (2012), this is likely to be a reflection of the changing nature of service innovation practices.

MANAGEMENT IMPLICATIONS

The results clearly demonstrate that service innovation is different from product innovation. Whilst there are some universal success factors that transcend the boundaries between services and products, the lack of alignment of the relative importance between service and product sectors suggests that innovation in the two sectors is indeed different, and that managers in service companies need to have different priorities to maximize their return on innovation investments. The differences imply that if managers in service firms blindly follow existing research from product firms this would result in sub optimal decisions. Compared to product firms, service firms must concentrate on the augmented offering attempting to be truly innovative. Services are intangible; the customer cannot experience the offering (they cannot see, touch, or try it) a priori. Design-unique features and benefits, which cannot be experienced or seen until later, should not take precedence over designing high quality service delivery systems as part of an augmented service offering. To achieve this, service innovation processes must be open, driven by customer engagement and processes must be in place to manage the knowledge that open innovation generates. Efforts must also be made to encourage and support employee engagement during development.

The findings on the moderating role of service type indicate that managers in different types of service firms should not approach all service innovation in the same way. Explicit services industries, such as banking, insurance, telecommunications, and utilities, are process-based and are delivered with the aid of technology. Developing new services in these industries requires mechanisms to manage the large amounts of explicit information generated and to build synergies with existing systems. Tacit or experiential services such as professional services, hospitability, transportation, and health are more heterogeneous due to inconsistency in human performance (Dotzel et al., 2013). As the services being developed are fuzzier, the development processes are more complex. Hence, more effort and resources are needed in managing the processes and the team doing the service innovation process.

The results show that whilst the antecedents identified in this meta-analysis are, on the whole, significant for both success and SCA, the focus of manager efforts need to be subtly different. If the objectives of the firm are immediate success, then firms should build on existing capabilities in carefully chosen markets putting effort into effectively launching new services and service improvements. If the objectives of the firm are to develop a longer-term SCA, the aim is to be more innovative by directly involving the customer and by investing in organic management practices. This must be supported by investing in the quality of the services delivered. These results should be built into the scorecards and portfolio management tools that service firms employ to prioritize projects and manage their development portfolio.

Finally, many product firms are undertaking service innovation. They are "servitizing" their product offerings and increasingly generating revenues from services. Even when not generating revenues, a product firm's services are important elements of their competitive advantage. As part of this servitization process, they need to adapt their innovation practices and capabilities to recognize the differences between services and products.

LIMITATIONS AND SUGGESTION FOR FUTURE RESEARCH

Although the present study provides valuable insight into the antecedents of service innovation performance, it has a number of limitations that should be taken into account when interpreting and evaluating its results. First, not all of the articles identified provided the information necessary to carry out a quantitative synthesis, and thus had to be removed from the meta-analytic database. Second, a more detailed moderator analysis was not possible due to the lack of sufficient information on potential moderators. Information on some study characteristics, such as the number and functional perspective of informants, was absent in a considerable number of studies that reported main effects information. Or there was insufficient variability across studies with regard to some study characteristics, such as the number of items used to measure the dependent variable and whether it was measured in absolute or relative terms. Nearly all antecedents were found to have a significant influence on service innovation performance. This is not surprising as there is a lack of reporting non-significant research results in journals. Additional studies that failed to find relationships may not have been published, although file-drawer analyses suggest that this is not a significant problem.

Important differences were found between explicit and tacit service sectors. The distinction between explicit and tacit services was based on an *a priori* categorization (Storey and Kahn, 2010). Further research could delve deeper into the impact of service sector characteristics on the antecedents of service innovation performance. Finally, it is important that newly reported and rather uncharted areas, such as the impact of design (Candi, 2010) and alliances (Schleimer and Shulman, 2011) on service innovation performance, should be further examined in future research attempts in order to further enhance our understanding of the "how's and whys" of successful service innovation.

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Table 1. Main effect results for commercial success

	k	*N*	*avN*	*min r*	*max r*	r_{obs}	$\bar{r}$	*ρ*	*rank*	*SDE* $\bar{r}$	*LB*	*UB*	Var_{obs}	Var_{samp}	Var_{rel}	Var_{expl}	*Q-stat*	*fail-safe k*
Service offering characteristics																		
Service offering advantage	13	1791	138	-0.05	0.62	0.28	0.29	0.34 *	21=	0.06	0.17	0.41	0.05	0.01	0.00	13%	105.37 *	62
Service quality	15	2193	146	0.16	0.56	0.32	0.31	0.36 *	16=	0.02	0.26	0.35	0.01	0.01	0.00	74%	22.41	77
Service innovativeness	17	2493	147	-0.11	0.77	0.39	0.38	0.43 *	6	0.05	0.27	0.48	0.05	0.01	0.00	13%	152.67 *	111
Technological sophistication	18	2994	166	-0.01	0.56	0.27	0.30	0.38 *	13=	0.04	0.22	0.38	0.03	0.00	0.00	19%	106.40 *	91
Proficient operations & delivery	15	3480	232	-0.30	0.65	0.25	0.24	0.29 *	25=	0.07	0.10	0.38	0.08	0.00	0.00	5%	301.62 *	56
Service responsiveness	26	4692	180	-0.08	0.58	0.31	0.33	0.39 *	12	0.03	0.26	0.39	0.03	0.00	0.00	18%	161.05 *	144
Strategy characteristics																		
Synergistic strategy	9	1410	157	-0.26	0.45	0.16	0.21	0.25 *	30	0.06	0.09	0.32	0.03	0.01	0.00	19%	48.58 *	28
Market orientation	31	5281	170	-0.26	0.82	0.33	0.30	0.35 *	19=	0.04	0.21	0.38	0.06	0.00	0.00	9%	383.70 *	153
Innovation strategy	30	5844	195	0.17	0.91	0.39	0.38	0.45 *	4	0.03	0.32	0.44	0.03	0.00	0.00	17%	223.00 *	199
Strategic orientation	8	1940	243	-0.08	0.34	0.13	0.16	0.26 *	28=	0.05	0.06	0.25	0.02	0.00	0.00	22%	40.68 *	17
Process characteristics																		
Efficiency of development process	16	2257	141	-0.12	0.67	0.36	0.35	0.44 *	5	0.05	0.26	0.44	0.03	0.01	0.00	19%	100.05 *	97
Formal/structured development	21	3250	155	0.12	0.71	0.34	0.35	0.41 *	9=	0.03	0.29	0.42	0.02	0.00	0.00	25%	98.05 *	128
Pre-development task proficiency	10	1519	152	0.18	0.47	0.31	0.32	0.36 *	16=	0.03	0.25	0.38	0.01	0.01	0.00	55%	19.56 *	53
Marketing research task proficiency	8	1200	150	-0.04	0.58	0.32	0.34	0.40 *	11	0.07	0.22	0.47	0.03	0.01	0.00	17%	54.06 *	47
Technical development proficiency	9	1479	164	-0.05	0.44	0.23	0.23	0.26 *	28=	0.04	0.15	0.31	0.02	0.01	0.00	37%	25.65 *	32
Launch proficiency	13	2127	164	0.23	0.55	0.41	0.43	0.50 *	1	0.03	0.38	0.49	0.01	0.00	0.00	45%	35.09 *	99
Team characteristics																		
Customer integration/input	14	1758	126	-0.06	0.57	0.28	0.29	0.34 *	21=	0.05	0.20	0.38	0.03	0.01	0.00	23%	63.06 *	68
Front-line staff involvement	14	2035	145	0.13	0.57	0.35	0.37	0.42 *	7=	0.04	0.28	0.45	0.03	0.01	0.00	22%	72.45 *	89
External realtions	17	5196	306	-0.05	0.66	0.29	0.39	0.42 *	7=	0.04	0.32	0.47	0.02	0.00	0.00	13%	175.26 *	117
Team/organizational climate	14	1759	126	0.09	0.58	0.29	0.31	0.38 *	13=	0.03	0.25	0.38	0.02	0.01	0.00	44%	34.42 *	74
Team empowerment	12	1458	122	0.05	0.54	0.22	0.22	0.27 *	27	0.04	0.14	0.30	0.02	0.01	0.00	39%	33.06 *	42
Cross-functional integration	17	2465	145	0.09	0.60	0.28	0.26	0.29 *	25=	0.04	0.18	0.33	0.02	0.01	0.00	29%	63.95 *	70
Internal communication	28	4495	161	0.05	0.78	0.32	0.34	0.41 *	9=	0.03	0.28	0.40	0.03	0.00	0.00	21%	154.70 *	160
Knowledge integration mechanisms	10	1295	130	0.02	0.48	0.31	0.31	0.36 *	16=	0.04	0.24	0.38	0.01	0.01	0.00	54%	19.76 *	52
Project size	3	215	72	-0.30	0.17	0.00	0.02	0.02	37	0.12	-0.22	0.26	0.05	0.01	0.00	31%	9.76 *	n/a
Organizational characteristics																		
Innovation culture	20	3797	190	-0.07	0.71	0.27	0.26	0.31 *	23	0.05	0.16	0.35	0.04	0.00	0.00	11%	194.79 *	82
Absorptive capacity	15	2657	177	0.06	0.67	0.40	0.40	0.48 *	2	0.05	0.31	0.49	0.03	0.00	0.00	15%	120.95 *	105
Senior management support	21	3508	167	0.01	0.68	0.31	0.30	0.35 *	19=	0.04	0.23	0.37	0.03	0.00	0.00	20%	119.97 *	106
Dedicated human resources	20	2810	141	0.04	0.51	0.31	0.32	0.38 *	13=	0.03	0.27	0.37	0.01	0.01	0.00	47%	46.72 *	107
Innovation resources	31	8420	272	-0.16	0.67	0.29	0.26	0.30 *	24	0.03	0.21	0.31	0.02	0.00	0.00	17%	210.35 *	130
Organizational design	11	1664	151	0.06	0.85	0.36	0.41	0.46 *	3	0.07	0.28	0.54	0.05	0.00	0.00	11%	121.63 *	79
Firm reputation	8	848	106	-0.07	0.70	0.19	0.12	0.12	33	0.08	-0.04	0.29	0.06	0.01	0.00	17%	48.93 *	n/a
Firm size	18	6400	356	-0.12	0.26	0.05	0.03	0.03	36	0.02	-0.01	0.07	0.01	0.00	0.00	41%	43.58 *	n/a
Firm age	8	1415	177	-0.21	0.29	0.01	-0.06	-0.06	35	0.05	-0.17	0.04	0.02	0.01	0.00	25%	31.73 *	n/a
Marketplace characteristics																		
Market attractiveness	14	2858	204	-0.09	0.51	0.19	0.17	0.20 *	32	0.04	0.08	0.26	0.03	0.00	0.00	17%	85.54 *	33
Market turbulence	17	2916	172	-0.01	0.42	0.18	0.19	0.22 *	31	0.03	0.12	0.25	0.02	0.01	0.00	28%	65.01 *	46
Environmental uncertainty	19	3816	201	-0.32	0.31	0.12	0.07	0.09	34	0.04	-0.01	0.15	0.03	0.00	0.00	16%	122.29 *	n/a

* $p<0.05$; ***k:*** number of correlations analyzed; ***N:*** combined sample size; ***avN:*** average sample size (N/k); ***min r:*** minimum reported correlation; ***max r:*** maximum reported correlation; r_{obs}***::*** simple average of reported (uncorrected) correlations; $\bar{r}$***:*** sample-weighted average of reported (uncorrected) correlations; ***ρ:*** estimated true correlation corrected for sampling error and unreliability; ***rank***: rank order of the antecedent on the dependent variable, ***SDE*** $\bar{r}$ **:** sampling error variance of the mean observed correlation (random effects formula); ***LB:*** lower bound of 95% confidence interval around $\bar{r}$; ***UB:*** upper bound of 95% confidence interval around the $\bar{r}$; var_{obs}***:*** observed variance in effect sizes; var_{samp}***:*** variance due to sampling error; var_{rel}***:*** variance due to differences in reliability of construct measurement; var_{expl}***:*** percentage of observed variance explained by sampling and measurement errors; ***Q-stat***: Q statistic for heterogeneity with $df = k$-1 (when significant, search for moderators); ***fail-safe k:*** number of additional unpublished or overlooked studies that would need to be included in the database to reduce the effect size to ρ=0.05.

Table 2. Main effect results for SCA

	k	*N*	*avN*	*min r*	*max r*	r_{obs}	$\bar{r}$	*ρ*	*rank*	*SDE* $\bar{r}$	*LB*	*UB*	Var_{obs}	Var_{samp}	Var_{rel}	Var_{expl}	*Q-stat*	*fail-safe k*
Service offering characteristics																		
Service offering advantage	9	1378	153	0.06	0.69	0.31	0.28	0.33 *	25=	0.06	0.15	0.41	0.04	0.01	0.00	16%	61.19 *	41
Service quality	13	1898	146	0.04	0.69	0.45	0.45	0.53 *	2	0.06	0.34	0.56	0.04	0.00	0.00	13%	121.79 *	104
Service innovativeness	9	1205	134	0.20	0.73	0.47	0.44	0.52 *	3=	0.07	0.31	0.57	0.04	0.00	0.00	16%	73.59 *	71
Technological sophistication	11	1585	144	0.09	0.54	0.31	0.32	0.37 *	15=	0.04	0.23	0.40	0.02	0.01	0.00	30%	39.32 *	59
Proficient operations & delivery	8	1888	236	-0.06	0.64	0.29	0.28	0.34 *	23=	0.09	0.11	0.45	0.06	0.00	0.00	6%	134.77 *	37
Service responsiveness	17	2465	145	0.02	0.55	0.30	0.31	0.38 *	13=	0.03	0.26	0.37	0.01	0.01	0.00	44%	41.48 *	89
Strategy characteristics																		
Synergistic strategy	5	942	188	-0.10	0.32	0.09	0.13	0.16 *	31=	0.06	0.01	0.26	0.02	0.01	0.00	26%	19.92 *	8
Market orientation	20	3235	162	-0.08	0.71	0.33	0.31	0.37 *	15=	0.05	0.23	0.40	0.04	0.01	0.00	14%	163.39 *	106
Innovation strategy	14	2506	179	0.23	0.71	0.41	0.41	0.51 *	6	0.03	0.34	0.48	0.02	0.00	0.00	29%	60.86 *	101
Strategic orientation	5	1385	277	0.09	0.38	0.26	0.28	0.46 *	8	0.04	0.21	0.36	0.01	0.00	0.00	73%	12.74 *	23
Process characteristics																		
Efficiency of development process	11	1431	130	-0.03	0.71	0.40	0.39	0.52 *	3=	0.06	0.26	0.51	0.04	0.01	0.00	16%	86.86 *	74
Formal/structured development	10	1119	112	-0.23	0.78	0.31	0.30	0.37 *	15=	0.09	0.12	0.47	0.08	0.01	0.00	10%	105.85 *	49
Pre-development task proficiency	4	491	123	0.19	0.51	0.31	0.32	0.38 *	13=	0.06	0.21	0.43	0.01	0.01	0.00	56%	7.71 *	22
Marketing research task proficiency	3	349	116	0.03	0.47	0.31	0.26	0.34 *	23=	0.12	0.03	0.49	0.04	0.01	0.00	20%	16.55 *	13
Technical development proficiency	4	471	118	0.02	0.51	0.28	0.25	0.29 *	28	0.09	0.07	0.44	0.04	0.01	0.00	23%	18.91 *	16
Launch proficiency	9	1328	148	0.01	0.49	0.26	0.25	0.30 *	27	0.05	0.15	0.35	0.02	0.01	0.00	29%	33.28 *	36
Team characteristics																		
Customer integration/input	8	963	120	0.14	0.49	0.36	0.36	0.42 *	10	0.03	0.30	0.41	0.01	0.01	0.00	58%	14.87 *	49
Front-line staff involvement	5	852	170	0.12	0.49	0.24	0.23	0.28 *	29	0.06	0.12	0.35	0.02	0.01	0.00	32%	15.91 *	18
External realtions	7	804	115	0.11	0.52	0.34	0.30	0.37 *	15=	0.06	0.19	0.41	0.02	0.01	0.00	34%	21.62 *	36
Team/organizational climate	8	1221	153	0.20	0.55	0.41	0.45	0.55 *	1	0.03	0.40	0.51	0.01	0.00	0.00	75%	13.41	65
Team empowerment	6	989	165	0.19	0.41	0.29	0.27	0.33 *	25=	0.04	0.21	0.33	0.01	0.01	0.00	78%	9.26	26
Cross-functional integration	13	2009	155	0.17	0.58	0.33	0.35	0.44 *	9	0.03	0.29	0.41	0.01	0.00	0.00	46%	32.69 *	79
Internal communication	15	2422	161	-0.10	0.61	0.29	0.30	0.37 *	15=	0.04	0.23	0.37	0.02	0.01	0.00	30%	56.31 *	75
Knowledge integration mechanisms	8	1143	143	0.08	0.47	0.31	0.34	0.40 *	11=	0.04	0.27	0.41	0.01	0.01	0.00	58%	14.71 *	46
Project size	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Organizational characteristics																		
Innovation culture	10	2110	211	0.02	0.62	0.37	0.32	0.40 *	11=	0.06	0.20	0.45	0.04	0.00	0.00	10%	106.59 *	54
Absorptive capacity	10	1508	151	0.12	0.82	0.43	0.43	0.52 *	3=	0.06	0.31	0.55	0.04	0.00	0.00	15%	82.45 *	76
Senior management support	13	1993	153	-0.21	0.57	0.30	0.29	0.36 *	22	0.06	0.18	0.40	0.04	0.01	0.00	15%	97.29 *	61
Dedicated human resources	13	1859	143	0.11	0.55	0.31	0.31	0.37 *	15=	0.03	0.24	0.37	0.02	0.01	0.00	41%	34.02 *	67
Innovation resources	16	2891	181	-0.12	0.56	0.27	0.30	0.37 *	15=	0.04	0.22	0.38	0.03	0.00	0.00	19%	94.07 *	80
Organizational design	8	1151	144	-0.03	0.73	0.36	0.42	0.49 *	7	0.08	0.28	0.57	0.05	0.00	0.00	12%	79.06 *	60
Firm reputation	7	955	136	-0.14	0.70	0.18	0.12	0.14	33	0.08	-0.04	0.28	0.05	0.01	0.00	15%	47.66 *	n/a
Firm size	12	2243	187	-0.12	0.25	0.01	0.03	0.03	35=	0.03	-0.02	0.09	0.01	0.01	0.00	55%	21.80 *	n/a
Firm age	3	396	132	-0.13	0.06	-0.01	-0.03	-0.03	35=	0.05	-0.13	0.07	0.01	0.01	0.00	95%	3.17	n/a
Marketplace characteristics																		
Market attractiveness	11	2208	201	-0.14	0.55	0.15	0.13	0.16 *	31=	0.06	0.02	0.25	0.04	0.00	0.00	13%	84.94 *	18
Market turbulence	10	1723	172	0.08	0.38	0.23	0.22	0.27 *	30	0.03	0.15	0.29	0.01	0.01	0.00	51%	22.09 *	34
Environmental uncertainty	8	1668	209	-0.40	0.38	0.10	0.08	0.10	34	0.07	-0.04	0.21	0.03	0.00	0.00	14%	58.19 *	n/a

* $p<0.05$; ***k:*** number of correlations analyzed; ***N:*** combined sample size; ***avN:*** average sample size (N/k); ***min r:*** minimum reported correlation; ***max r:*** maximum reported correlation; r_{obs}***::*** simple average of reported (uncorrected) correlations; $\bar{r}$***:*** sample-weighted average of reported (uncorrected) correlations; ***ρ:*** estimated true correlation corrected for sampling error and unreliability; ***rank***: rank order of the antecedent on the dependent variable, ***SDE*** $\bar{r}$ **:** sampling error variance of the mean observed correlation (random effects formula); ***LB:*** lower bound of 95% confidence interval around $\bar{r}$; ***UB***: upper bound of 95% confidence interval around the $\bar{r}$; var_{obs}***:*** observed variance in effect sizes; var_{samp}***:*** variance due to sampling error; var_{rel}***:*** variance due to differences in reliability of construct measurement; var_{expl}***:*** percentage of observed variance explained by sampling and measurement errors; ***Q-stat***: Q statistic for heterogeneity with $df = k$-1 (when significant, search for moderators); ***fail-safe k:*** number of additional unpublished or overlooked studies that would need to be included in the database to reduce the effect size to ρ=0.05.

Table 3. Top ten success factors comparison: Services and products

	Services		Products[1]
1[2]	*Launch proficiency*	1	Product advantage
2	**Absorptive capacity**	2	Market orientation
3	Organizational design	3=	*Launch proficiency*
4	**Innovation strategy**	3=	Dedicated human resources
5	Efficiency of development process	5	Pre-development task proficiency
6	Service innovativeness	6=	Innovation resources
7=	**Front-line staff involvement**	6=	Marketing research task proficiency
7=	External relations	6=	Team/organizational climate
9=	*Internal communication*	9	Strategic orientation
9=	Formal/structured development	10	*Internal communication*

[1] From Evanschitzky et al. (2012).

[2] Rank order of success factor.

Bold are success factors newly identified. *Italics* appear in both lists

Table 4. Success factor comparison: Commercial success and SCA

	Commercial success (ρ)	*SCA (ρ)*	*Z*
Service offering characteristics			
Service offering advantage	0.34 *	0.33 *	0.54
Service quality	0.36 *	**0.53** *	-8.91 *
Service innovativeness	0.43 *	**0.52** *	-3.79 *
Technological sophistication	0.38 *	0.37 *	0.08
Proficient operations & delivery systems	0.29 *	**0.34** *	-2.41 *
Service responsiveness	0.39 *	0.38 *	0.91
Strategy characteristics			
Synergistic strategy	**0.25** *	0.16 *	3.01 *
Market orientation	0.35 *	0.37 *	-1.75
Innovation strategy	0.45 *	**0.51** *	-3.87 *
Strategic orientation	0.26 *	**0.46** *	-8.61 *
Process characteristics			
Efficiency of development process	0.44 *	**0.52** *	-3.78 *
Formal/structured development process	0.41 *	0.37 *	1.57
Pre-development task proficiency	0.36 *	0.38 *	-0.58
Marketing research task proficiency	0.40 *	0.34 *	1.42
Technical development proficiency	0.26 *	0.29 *	1.42
Launch proficiency	**0.50** *	0.30 *	8.71 *
Team characteristics			
Customer integration/input	0.34 *	**0.42** *	-2.61 *
Front-line staff involvement	**0.42** *	0.28 *	4.62 *
External relations	0.42 *	0.37 *	1.64
Team/organizational climate	0.38 *	**0.55** *	-7.22 *
Team empowerment	0.27 *	**0.33** *	-2.02 *
Cross-functional integration	0.29 *	**0.44** *	-7.21 *
Internal communication	**0.41** *	0.37 *	2.32 *
Knowledge integration mechanisms	0.36 *	0.40 *	-1.56
Project size	0.02	-	-
Organizational characteristics			
Innovation culture	0.31 *	**0.40** *	-4.62 *
Absorptive capacity	0.48 *	0.52 *	-1.82
Senior management support	0.35 *	0.36 *	-0.63
Dedicated human resources	0.38 *	0.37 *	0.55
Innovation resources	0.30 *	**0.37** *	-4.04 *
Organizational design	0.46 *	0.49 *	-1.22
Firm reputation	0.12	0.14	-0.43
Firm size	0.03	0.03	-0.18
Firm age	-0.06	-0.03	-0.60
Marketplace characteristics			
Market attractiveness	**0.20** *	0.16 *	2.29 *
Market turbulence	0.22 *	**0.27** *	-2.34 *
Environmental uncertainty	0.09	0.10	-0.30

* $p<0.05$; ***ρ:*** estimated true correlation corrected for sampling error and unreliability; ***Z***: z-score for the difference between two estimated true correlation coefficients; **Bolded** numbers indicate which had a significantly larger effect size when *Z* is significant.

Table 5. Moderator analysis (1): Explicit and tacit services

	Explicit services (ρ)	*Tacit services (ρ)*	Q_b
Service offering characteristics			
Service offering advantage	0.39 *	0.35 *	0.51
Service quality	0.33 *	**0.42** *	-3.74 *
Service innovativeness	0.39 *	**0.54** *	-12.08 *
Technological sophistication	0.34 *	**0.43** *	-5.49 *
Proficient operations & delivery systems	**0.25** *	0.09	16.93 *
Service responsiveness	0.33 *	**0.48** *	-16.97 *
Strategy characteristics			
Synergistic strategy	**0.31** *	0.11	11.24 *
Market orientation	**0.37** *	0.30 *	4.84 *
Innovation strategy	0.43 *	**0.49** *	-5.24 *
Strategic orientation	0.17	**0.32** *	-11.67 *
Process characteristics			
Efficiency of development process	0.36 *	**0.46** *	-5.09 *
Formal/structured development process	0.34 *	**0.46** *	-8.96 *
Pre-development task proficiency	0.31 *	**0.45** *	-7.38 *
Marketing research task proficiency	0.36 *	0.46 *	2.36
Technical development proficiency	0.19 *	**0.30** *	-4.15 *
Launch proficiency	0.39 *	**0.52** *	-6.48 *
Team characteristics			
Customer integration/input	0.39 *	0.31 *	2.25
Front-line staff involvement	0.39 *	0.44 *	1.58
External relations	0.33 *	0.41 *	3.55
Team/organizational climate	0.36 *	0.27 *	2.27
Team empowerment	0.20 *	**0.47** *	20.59 *
Cross-functional integration	**0.37** *	0.24 *	8.79 *
Internal communication	0.32 *	**0.53** *	-38.44 *
Knowledge integration mechanisms	**0.40** *	0.25 *	5.15 *
Project size	-	-	-
Organizational characteristics			
Innovation culture	0.35 *	0.34 *	0.11
Absorptive capacity	0.39 *	**0.56** *	-11.60 *
Senior management support	0.29 *	**0.40** *	-9.34 *
Dedicated human resources	0.38 *	0.37 *	0.01
Innovation resources	0.36 *	0.35 *	0.10
Organizational design	0.37 *	**0.54** *	-8.28 *
Firm reputation	0.10	0.17	0.70
Firm size	0.02	**0.11** *	-5.56 *
Firm age	0.02	**-0.12**	7.04 *
Marketplace characteristics			
Market attractiveness	0.14 *	**0.28** *	-14.18 *
Market turbulence	0.18 *	**0.42** *	-20.98 *
Environmental uncertainty	**0.22** *	-0.13	104.75 *

*$p<0.05$; **ρ:** estimated true correlation corrected for sampling error and unreliability for moderator category subset; Q_b: between-group goodness-of-fit statistic; **Bolded** numbers indicate which of the 2 subgroups had a significantly larger effect size when Q_b is significant.

Table 6. Moderator analysis (2): Hofstede's cultural dimensions

	Power Distance			*Individuality*			*Uncertainty avoidance*			*Pragmatism/long-term*			*Masculinity*		
	Low (ρ)	***High (ρ)***	***Q_b***	***Low (ρ)***	***High (ρ)***	***Q_b***	***Low (ρ)***	***High (ρ)***	***Q_b***	***Low (ρ)***	***High (ρ)***	***Q_b***	***Low (ρ)***	***High (ρ)***	***Q_b***
Service offering characteristics															
Service offering advantage	**0.37** *	0.25 *	5.13 *	-	-	-	0.36 *	0.31 *	1.00	**0.41** *	0.13	26.94 *	-	-	-
Service quality	0.35 *	0.38 *	0.40	-	-	-	0.34 *	0.38 *	0.64	0.37 *	0.33 *	0.79	0.39 *	0.35 *	0.41
Service innovativeness	0.41 *	0.44 *	0.29	0.43 *	0.43 *	0.01	**0.51** *	0.39 *	8.54 *	0.33 *	**0.48** *	11.82 *	0.42 *	0.44 *	0.25
Technological sophistication	0.39 *	0.33 *	2.71	**0.51** *	0.35 *	8.65 *	0.35 *	0.41 *	2.94	**0.41** *	0.27 *	9.84 *	**0.46** *	0.33 *	10.08 *
Proficient operations & delivery	0.17	**0.53** *	100.44 *	-	-	-	0.10	**0.63** *	221.44 *	0.25 *	**0.39** *	12.15 *	**0.64** *	0.19 *	122.16 *
Service responsiveness	**0.42** *	0.28 *	14.73 *	-	-	-	**0.42** *	0.35 *	5.22 *	**0.44** *	0.32 *	13.94 *	0.29 *	**0.44** *	24.03 *
Strategy characteristics															
Synergistic strategy	**0.29** *	0.18	4.25 *	-	-	-	-	-	-	0.28 *	0.23 *	0.82	-	-	-
Market orientation	0.21 *	**0.48** *	100.84 *	**0.51** *	0.24 *	89.86 *	0.33 *	0.36 *	1.85	0.26 *	**0.44** *	42.85 *	**0.43** *	0.38 *	31.66 *
Innovation strategy	0.39 *	**0.55** *	31.79 *	**0.56** *	0.40 *	34.39 *	0.48 *	0.41 *	6.98 *	0.38 *	**0.55** *	38.06 *	**0.49** *	0.43 *	3.89 *
Strategic orientation	0.26	0.25 *	0.14	-	-	-	-	-	-	0.26 *	0.26 *	0.01	-	-	-
Process characteristics															
Efficiency of development process	**0.50** *	0.29 *	20.25 *	**0.60** *	0.42 *	5.76 *	0.40 *	**0.49** *	4.46 *	**0.52** *	0.21	40.98 *	0.49 *	0.43 *	0.98
Formal/structured development	0.36 *	**0.51** *	17.96 *	**0.55** *	0.36 *	22.70 *	0.37 *	**0.46** *	5.89 *	0.40 *	0.44 *	0.98	**0.65** *	0.36 *	39.86 *
Pre-development task proficiency	0.37 *	0.34 *	0.13	-	-	-	0.40 *	0.32 *	2.39	0.34 *	0.41 *	1.83	-	-	-
Marketing research task proficiency	**0.50** *	0.20	23.87 *	-	-	-	0.41 *	0.37 *	0.44	**0.52** *	0.14	35.59 *	-	-	-
Technical development proficiency	0.30 *	0.21 *	3.24	-	-	-	0.27 *	0.22 *	0.62	-	-	-	-	-	-
Launch proficiency	**0.54** *	0.41 *	6.00 *	0.45 *	0.51 *	1.23	0.46 *	0.54 *	2.94	-	-	-	-	-	-
Team characteristics															
Customer integration/input	0.29 *	**0.43** *	8.62 *	**0.46** *	0.29 *	11.62 *	**0.47** *	0.29 *	11.73 *	0.36 *	0.33 *	0.32	0.31 *	0.36 *	1.02
Front-line staff involvement	0.41 *	0.44 *	0.27	**0.60** *	0.38 *	14.67 *	0.40 *	0.49 *	3.39	0.43 *	0.42 *	0.06	-	-	-
External relations	0.43 *	0.38 *	3.65	0.39 *	0.43 *	1.17	0.37 *	0.43 *	1.92	0.37 *	0.43 *	2.90	**0.44** *	0.27 *	18.48 *
Team/orgnaizational climate	0.24 *	**0.42** *	8.83 *	0.37 *	0.38 *	0.05	0.30 *	**0.41** *	4.63 *	**0.41** *	0.30 *	4.61 *	**0.45** *	0.27 *	11.80 *
Team empowerment	0.16 *	**0.33** *	8.77 *	0.32 *	0.21 *	3.63	0.32 *	0.23 *	3.31	0.18 *	**0.46** *	24.67 *	0.19 *	**0.35** *	8.92 *
Cross-functional integration	0.30 *	0.28 *	0.16	-	-	-	**0.33** *	0.21 *	7.40 *	0.30 *	0.26 *	0.79	-	-	-
Internal communication	0.40 *	0.42 *	0.19	0.38 *	0.43 *	2.27	**0.45** *	0.39 *	3.84 *	0.41 *	0.41 *	0.06	0.40 *	0.42 *	0.80
Knowledge integration mechanisms	0.36 *	0.36 *	0.00	**0.43** *	0.30 *	5.14 *	0.38 *	0.35 *	0.28	0.32 *	0.40 *	2.18	0.33 *	0.38 *	0.82
Project size	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Organizational characteristics													-	-	-
Innovation culture	0.25 *	**0.55** *	55.22 *	**0.59** *	0.25 *	64.31 *	0.28 *	**0.37** *	5.22 *	0.22 *	**0.45** *	48.19 *	**0.45** *	0.26 *	26.48 *
Absorptive capacity	0.41 *	**0.56** *	15.45 *	0.47 *	0.49 *	0.28	0.46 *	0.50 *	0.99	0.46 *	0.53 *	2.10	0.48 *	0.49 *	0.04
Senior management support	0.32 *	**0.41** *	5.77 *	**0.52** *	0.31 *	22.11 *	0.29 *	**0.40** *	9.72 *	0.30 *	**0.43** *	12.75 *	0.36 *	0.35 *	0.12
Dedicated human resources	0.33 *	**0.41** *	4.65 *	**0.46** *	0.34 *	7.57 *	0.38 *	0.38 *	0.00	0.39 *	0.34 *	1.51	0.38 *	0.37 *	0.02
Innovation resources	0.29 *	**0.36** *	4.09 *	0.36 *	0.29 *	2.74	**0.37** *	0.26 *	23.30 *	**0.33** *	0.27 *	9.43 *	0.24 *	**0.37** *	31.98 *
Organizational design	0.29 *	**0.60** *	36.51 *	**0.71** *	0.37 *	37.72 *	**0.54** *	0.43 *	4.63 *	0.43 *	**0.57** *	5.96 *	0.49 *	0.40 *	2.64
Firm reputation	-0.02	**0.30** *	20.32 *	-	-	-	0.06	**0.22**	4.96 *	0.18 *	0.07	2.41	**0.37** *	0.03 *	19.72 *
Firm size	0.03	0.03	0.01	0.02	0.03	0.03	**-0.09** *	0.05 *	18.19 *	-0.03	0.06 *	10.32 *	0.04 *	0.01	1.82
Firm age	-0.09	0.03	3.66	0.03	-0.09	3.66	-0.04	-0.07	0.27	-	-	-	**-0.12**	0.01	5.41 *
Marketplace characteristics															
Market attractiveness	**0.23** *	0.15	4.19 *	0.14	**0.23** *	4.75 *	**0.26** *	0.08	20.56 *	0.20 *	0.20	0.01	0.07	**0.26** *	23.04 *
Market turbulence	**0.31** *	0.15 *	16.96 *	0.17 *	**0.25** *	3.93 *	0.22 *	0.23 *	0.02	**0.27** *	0.18 *	5.69 *	0.19 *	0.24 *	1.61
Environmental uncertainty	0.02	**0.22** *	35.34 *	**0.22** *	0.04	25.75 *	0.09	0.09	0.00	0.01	**0.25** *	47.13 *	0.09	0.10	0.11

*$p<0.05$; ***ρ:*** estimated true correlation corrected for sampling error and unreliability for moderator category subset; ***Q_b***: between-group goodness-of-fit statistic; ***Low:*** <50 in the Hofstede cultural dimension scale; ***High:*** >=50 in the Hofstede cultural dimension scale; **Bolded** numbers indicate which of the 2 subgroups had a significantly larger effect size when Q_b is significant.

Table 7. Moderator analysis (3): Level of analysis, publication source and publication year

	Level of analysis			*Publication source*			*Publication year*		
	Proj (ρ)	***Prog (ρ)***	***Q_b***	***Leading (ρ)***	***Other (ρ)***	***Q_b***	***Pre-2010 (ρ)***	***2010 & later (ρ)***	***Q_b***
Service offering characteristics									
Service offering advantage	0.31 *	**0.42** *	4.41 *	0.28 *	**0.42** *	7.57 *	0.35 *	0.33 *	0.07
Service quality	0.33 *	0.40 *	3.14	0.30 *	**0.41** *	5.65 *	0.36 *	0.36 *	0.01
Service innovativeness	0.40 *	0.44 *	0.95	0.34 *	**0.48** *	10.78 *	**0.51** *	0.38 *	8.86 *
Technological sophistication	0.19 *	**0.46** *	49.45 *	0.34 *	0.41 *	3.35	0.30 *	**0.46** *	19.13 *
Proficient operations & delivery systems	0.15	**0.37** *	41.07 *	0.11	**0.39** *	62.69 *	0.16	**0.37** *	35.69 *
Service responsiveness	**0.46** *	0.33 *	19.30 *	**0.44** *	0.35 *	8.45 *	0.39 *	0.40 *	0.11
Strategy characteristics									
Synergistic strategy	**0.33** *	0.15	10.03 *	**0.32** *	0.18	7.03 *	-	-	-
Market orientation	0.20 *	**0.43** *	64.73 *	0.28 *	**0.39** *	16.16 *	0.26 *	**0.41** *	26.00 *
Innovation strategy	0.48 *	0.45 *	0.75	0.40 *	**0.49** *	12.69 *	0.39 *	**0.48** *	10.15 *
Strategic orientation	-	-	-	**0.46** *	0.03	90.92 *	-	-	-
Process characteristics									
Efficiency of development process	0.30 *	**0.53** *	30.24 *	0.39 *	0.47 *	2.70	0.38 *	**0.48** *	5.61 *
Formal/structured development	0.35 *	**0.44** *	3.96 *	0.41 *	0.42 *	0.01	0.41 *	0.43 *	0.37
Pre-development task proficiency	0.33 *	0.41 *	1.73	0.38 *	0.33 *	0.87	0.36 *	0.38 *	0.10
Marketing research task proficiency	-	-	-	0.42 *	0.33 *	1.92	-	-	-
Technical development proficiency	-	-	-	0.22 *	**0.38** *	7.49 *	-	-	-
Launch proficiency	0.46 *	**0.57** *	6.44 *	0.50 *	0.51 *	0.18	0.45 *	**0.57** *	7.13 *
Team characteristics									
Customer integration/input	0.20 *	**0.44** *	24.14 *	0.24 *	**0.37** *	4.01 *	**0.53** *	0.29 *	17.01 *
Front-line staff involvement	0.41 *	0.45 *	0.98	0.44 *	0.40 *	0.65	0.43 *	0.40 *	0.35
External relations	-	-	-	0.43 *	0.39 *	1.76	0.41 *	0.42 *	0.10
Team/organizational climate	0.35 *	0.39 *	0.66	0.35 *	0.39 *	0.58	0.38 *	0.38 *	0.00
Team empowerment	0.30 *	0.26 *	0.29	0.18 *	**0.35** *	10.30 *	**0.45** *	0.18 *	22.80 *
Cross-functional integration	**0.35** *	0.24 *	6.95 *	**0.35** *	0.26 *	5.48 *	**0.43** *	0.18 *	37.02 *
Internal communication	0.38 *	0.42 *	1.28	0.39 *	0.43 *	2.05	0.40 *	0.42 *	0.31
Knowledge integration mechanisms	-	-	-	0.30 *	0.40 *	2.92	0.33 *	0.42 *	2.45
Project size	-	-	-	-	--	-	-	-	-
Organizational characteristics									
Innovation culture	0.33 *	0.30 *	0.40	0.32 *	0.30 *	0.47	0.28 *	0.32 *	1.53
Absorptive capacity	0.50 *	0.48 *	0.18	0.29 *	**0.55** *	31.20 *	0.48 *	0.48 *	0.01
Senior management support	0.27 *	**0.37** *	3.78 *	0.28 *	**0.39** *	9.99 *	0.32 *	0.36 *	1.26
Dedicated human resources	0.40 *	0.36 *	0.83	0.36 *	0.38 *	0.21	0.38 *	0.38 *	0.00
Innovation resources	0.33 *	0.29 *	1.27	0.29 *	0.31 *	0.47	**0.43** *	0.26 *	39.73 *
Organizational design	-	-	-	0.28 *	**0.52** *	18.06 *	0.44 *	0.47 *	0.37
Firm reputation	0.10	0.15	0.42	0.00	**0.25** *	13.28 *	**0.18**	0.02	4.57 *
Firm size	-	-	-	0.01	**0.09** *	7.07 *	-	-	-
Firm age	-	-	-	0.07	**-0.13** *	11.45 *	-	-	-
Marketplace characteristics									
Market attractiveness	**0.39** *	0.09	59.71 *	0.23 *	0.18 *	1.39	**0.35** *	0.15 *	21.97 *
Market turbulence	**0.31** *	0.18 *	9.39 *	0.18 *	**0.26** *	4.47 *	0.28 *	0.21 *	2.27
Environmental uncertainty	**0.18**	0.06	8.96 *	**0.22** *	0.03	30.62 *	**0.29** *	0.05	33.75 *

*$p<0.05$; ***ρ:*** estimated true correlation corrected for sampling error and unreliability for moderator category subset; ***Q_b***: between-group goodness-of-fit statistic; ***Proj:*** project level of analysis; ***Prog:*** program level of analysis; ***Leading*** publications rated 4 ABS (2010) ranking; **Bolded** numbers indicate which of the 2 subgroups had a significantly larger effect size when Q_b is significant.

APPENDIX. Definitions of service innovation success factors

Success factor	Definition
Service offering characteristics	
Service offering advantage	The superiority, differentiation and/or value over competitive offerings [6,7,9]
Service quality	The quality of the interactions between customers and the organization [9,11]
Service innovativeness	The degree of newness/originality/radicalness of the service offering [1,6,7,9]
Technological sophistication	Perceived technological sophistication of the service offering [6,7]
Proficient operations & delivery systems	The degree to which the operating and delivery systems can cope with the requirement of customers and the appropriateness of the technology inherent in them [4]
Service responsiveness	Extent to which service is perceived as satisfying desires/needs of the customer [6,7,9]
Strategy characteristics	
Synergistic strategy	Congruency between the existing skills and capabilities of the firm and the requirements of the new service [6,7,9]
Market orientation	Degree of orientation towards its internal, competitor, and customer environments [6,7,9]
Innovation strategy	Organization's openness to new ideas and propensity to change [1]
Strategic orientation	Strategic impetus, orientation, and focus of corporate strategy [6]
Process characteristics	
Efficiency of development process	Lower than expected development time and/or cost [9,10]
Formal/structured development process	Employment of explicit rules and formalized development procedures [1,6,7,9]
Pre-development task proficiency	Proficiency with which the firm executes the pre-development activities (e.g. idea generation, screening, business analysis) [6,7]
Marketing research task proficiency	Proficiency with which the firm executes the research-related activities (e.g. test marketing, product tests, market research) [6,7]
Technical development proficiency	Proficiency with which the firm executes the technical/operational development activities [3]
Launch proficiency	Proficiency with which a firm launches and communicates the new service [6,7,9]
Team characteristics	
Customer integration/input	Involvement of customers during development and incorporation of customer input [6,7,9]
Front-line staff involvement	The competence and extent of involvement of frontline staff during development [9,10]
External relations	Coordination and cooperation between the firm and other organizations during development [1,6]

Success factor	Definition
Team/organizational climate	The extent to which decisions are governed by the team/organization's shared values and norms [6]
Team empowerment	The decision-making decentralized autonomy of the project team [1,6]
Cross-functional integration	The degree of cooperation among multiple functions and interaction among team members during development [1,6,7,9]
Internal communication	Level of communication and knowledge dissemination among departments during development [6,7,9]
Knowledge integration mechanisms	Processes and structures that ensure the capture, analysis, interpretation, and integration of knowledge during development [5]
Project size	Size of the project [6]
Organizational characteristics	
Innovation culture	An atmosphere that-stimulates creative employees [9]
Absorptive capacity	The process through which a firm recognizes the value of new information, assimilates it, and applies it to performing development activities [1,2]
Senior management support	Degree of senior management support for a development initiative [1,6,7,9]
Dedicated human resources	Focused commitment of personnel resources with relevant expertise and knowledge to service development initiatives [1,6,7,]
Innovation resources	Commitment of resources and facilities for service development initiatives [6,7]
Organizational design	Organizational design such as reward structure, job design [6]
Firm reputation	Customers confidence in the organization [4]
Firm size	Size of the organization (no. of employees, turnover) [6]
Firm age	Age of the organization
Marketplace characteristics	
Market attractiveness	Attractiveness of the market due to the expected potential of the market and the degree of competitive response in the market [6,7,9]
Market turbulence	The extent to which customer preferences change [8]
Environmental uncertainty	Degree of uncertainty in the general operating environment faced by the firm [6]

[1] Chen et al., 2010; [2] Cohen and Levinthal, 1990; [3] Cooper and de Brentani, 1991; [4] Cooper et al., 1994; [5] de Luca and Atuahene-Gima, 2007; [6] Evanschitzky et al., 2012; [7] Henard and Szymanski, 2001; [8] Jaworski and Kohli, 1993; [9] Kuester et al., 2013; [10] Melton and Hartline, 2010; [11] Storey and Easingwood, 1998.

FOOTNOTES

[i] Whilst *product* is often used as a generic term to encompass both manufactured tangible goods and intangible services, this study refers to products and services separately.

[ii] Consistent with Dotzel et al.'s (2013) definition of service innovation, this article uses the terms service innovation performance and service innovation success as equivalents.

[iii] For a complete list of articles in the database see the online supplement.

[iv] The 75% rule and *Q*-statistic yielded consistent results for all relationships studied except for the link between service quality and commercial success. Sampling and measurement errors explained 74% of the variance in the service quality – commercial success relationship, which is marginally lower than the 75% cut-off for homogeneity. However, the *Q*-statistic was non-significant, indicating a homogeneous relationship. Since the *Q*-statistic was large in magnitude, it was chosen to err on the side of caution and treat the service quality – commercial success link as heterogeneous and include it in the subsequent moderator analyses.

[v] Only the relationships involving commercial success are reported due to the lack of sufficient number of observations for SCA.